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Does the Internet improve business? An empirical inquiry into the perceived strategic value and contribution of the Internet

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ABSTRACT

The Internet has become an indispensable tool for business. While it is generally presumed that the Internet can provide a competitive edge over competition, no substantive empirical evidence linking the Internet to organizational performance has been presented. This study empirically tests the connection between the use of the Internet and the perceived strategic importance of the Internet and its contribution to business using LISREL confirmatory factor analysis. The findings of this study suggest that management's strategic emphasis on the Internet affect the diffusion of Internet technology in an organization and these two factors collectively improve business performance.

INTRODUCTION

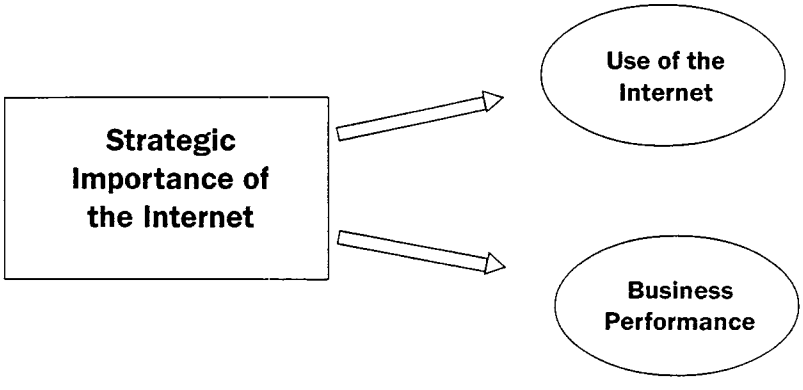
It is widely accepted that the Internet can help business improve performance. For many organizations, it has already become an indispensable tool. As the technology matures and its use spreads, the Internet is no longer just a tool to casually post information. Technically savvy organizations have already deployed the technology in a multitude of ways to gain competitive edge over the competition. Today no one questions the strategic significance of the Internet and the impact of the Internet is widely recognized and documented in many facets of business-market offering and marketing activities (Palmer & Griffith, 1998), buyer's research cost (Bakos, 1991), inventory and monitoring control (Bakos, 1991), cost savings and internal restructuring (Clarke, 1999), and customer relations (Mishina, 1998) among others. The Internet, when successfully implemented, is believed to serve as a sounding board to create and sustain a competitive edge over competition (Berthon et al., 1996; Clark, 1997; Hoffman & Novak, 1996). However, whether and how the Internet actually provides anticipated benefits and thus endows strate-

gic value is another matter and there is little empirical evidence that links the Internet to improved business performance. Thus we conducted an empirical study in an attempt to address the following two questions:

1. Does management's strategic emphasis on the Internet affect its use in an organization?
2. Does Internet use, in turn, improve business performance?

We believe that how management views the Internet has a significant impact on how an organization actually uses it. As evidenced in many studies, strategic emphasis of a new technology by management is a crucial indicator of how successfully the new technology will be diffused in an organization (Gibson & Nolan, 1974; McFarlan & McKinney, 1984; Nolan, 1979; Zmud, 1982 & 1984). In turn, successful diffusion and implementation of the technology will help business improve its performance. To understand how organizations deploy the Internet and how it affects business, we proposed a model that depicts the relationships among perceived strategic importance of the Internet, diffusion of the technology and business performance as shown in Figure 1.

Figure 1. Research Model



In the model strategic importance of the Internet serves as the independent variable. Management's support has been reported crucial to effective assimilation of a technology (Raho, Belohlave & Fiedler, 1987). The strategic emphasis of the Internet placed by the management of an organization influences the subsequent processes and is therefore an important juncture to study other aspects of the technology.

In order to observe and measure the use of the Internet, we borrowed a framework suggested by Koh and Balthazard (1998). The framework recognizes three main categories of Internet uses in business -- (1) Informational use, (2) Transactional use, and (3) Operational use -- and describes how the usage of the Internet evolves as the technology matures.

After reviewing the literature on organizational performance within the context of information systems (IS) and information technology (IT) and taking unique and pertinent characteristics of the Internet (e.g., ubiquity and global presence) into consideration, we chose profit, market share, and geographic expansion as the three measures of organizational performance.

In the following section, we describe the process and rationale for the research model with a review of the literature relevant to the study.

BACKGROUND AND LITERATURE

Strategic Importance of the Internet

The ability to assimilate and apply IT to gain and sustain a strategic advantage has been a challenge for many organizations. Numerous studies examined the diffusion of IT in organizations. Some examined attributes or characteristics influencing diffusion such as management attitudes, formalization, and centralization (Zmud, 1982, 1984) while others attempted to provide models describing the overall diffusion process (Gibson & Nolan, 1974; Nolan, 1979; McFarlan & McKenney, 1982). Most of these studies imply that the perception and recognition of the strategic importance of a technology play a crucial role in successfully assimilating the technology. Furthermore management needs to understand the process in which the technology diffuses into an organization. Several studies attempted to identify a set of distinctive stages of technology assimilation processes. Most notably McFarlan and McKenney (1982) segmented the diffusion process into four phases: (1) Technology identification and investment, (2) Experimentation, learning, and adaptation, (3) Rationalization and management control, and (4) Widespread technology transfer. They further argued that to effectively utilize IT companies should plan and manage IT by anticipating and focusing on problems and issues specific to each stage. However, no studies, particularly empirical ones, have been conducted to recognize and understand the diffusion process of the Internet technology.

Diffusion of Internet Technology

In order to recognize and measure the level of diffusion of the Internet technology, we adopted Koh and Balthazard's (1998) Internet usage framework. According to the framework, organizations use the Internet primarily for one or more of the three reasons: (1) To disseminate information (Informational use), (2) To sell goods and services (Transactional use, and (3) To support business operations (Operational use). This taxonomy, coined as "three-ring model" since each Internet function is depicted as a ring (Figure 2), captures a vast array of Internet applications in three simple and intuitive categories.

The framework further proposes that organizations pass through an evolutionary path in the way they utilize the Internet as depicted as three sequential three-ring diagrams (Figure 2a, b, and c). In the earliest stage, an organization uses the Internet primarily for informational purposes because it is relatively simple and inexpensive to do, and the company perceives a quick

Figure 2. "Three-Ring Model" - An Internet Usate and Diffusion Model

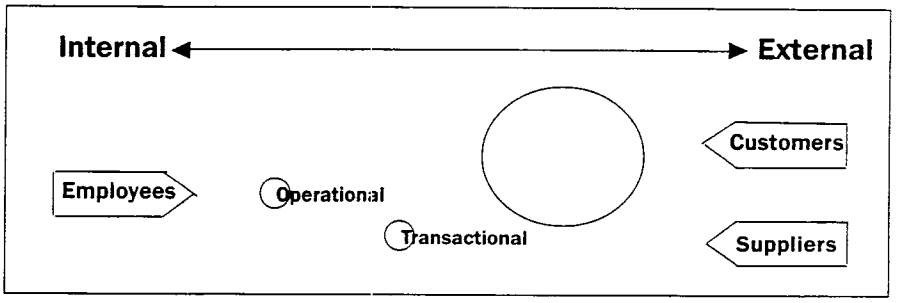


Figure 2a

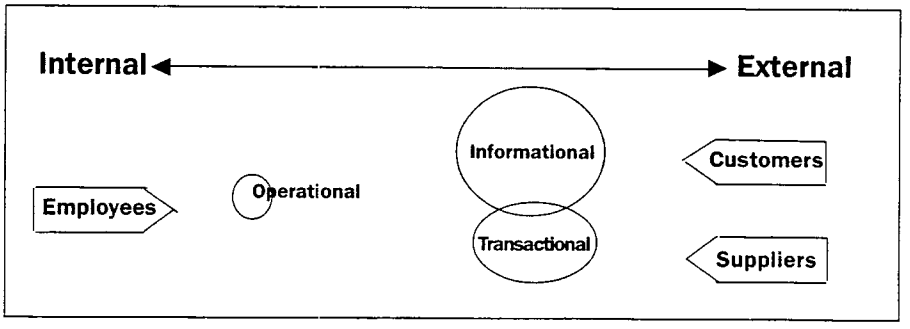


Figure 2b

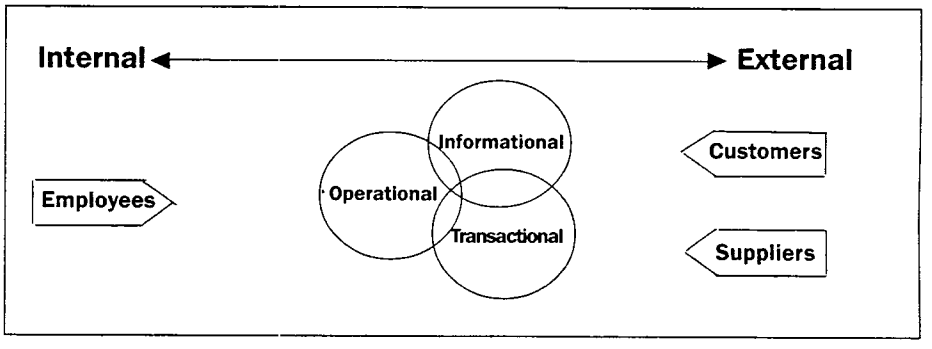


Figure 2c

and substantial return on investment (see Figure 2a). As organizations become more familiar with the technology, they expand their Internet applications to increase and facilitate transactions of their products and services (see Figure 2b). At this point, integrating Internet applications with existing applications and databases become critical. Eventually companies realize that the Internet is more than a technology for communication and exchange of data over the networks. The Internet becomes a platform on which all applications can be integrated and coordinated. In the final stage, all Internet applications are tightly integrated into a cohesive business agent see Figure 2c).

Impact of Information Technology on the Organizational Performance

The impact of IT on organizational performance has been one of the most debated issues in IS. Despite the enormous investments in IT, some argue that it has not directly contributed to the improvement of organizational performance (Strassman, 1990). Although no conclusive evidence has been presented to close the debate, many studies have attempted to demonstrate -- anecdotally and empirically -- that increased IT spending is associated with improved organizational performance and enhanced profitability (Harris & Katz, 1989). Some even ventured to measure the magnitude of the impact of IT on businesses and industries. For example, Roach (1991) estimated that a 20 percent annualized increase in IT expenditure during the 1980's and 1990's in the banking industry contributed a 45 percent gain in the market value of the entire industry. Business managers are increasingly convinced that IT investment improves operations, increases productivity, boosts customer satisfaction, and controls cost (Katz, 1993). Bharadwaj (2000) empirically demonstrated by comparing two groups of organizations that firms with high IT capability tend to outperform a control sample of firms on a variety of profits and cost-based performance measures.

Other studies presented a more cautious view of the link between IT investment and organizational performance. Mahmood and Mann (1993) suggested that return on IT investment may vary depending on how one assesses IT investments. While individual IT investments may not bring a substantial result separately, a concerted set of IT investments as a whole may have a stronger link to organizational performance. Furthermore, IT alone does not produce gain in organizational performance. Powell and Dent-Micallef (1997) demonstrated that IT by itself had not produced sustainable performance advantages in the retail industry. Rather, they contended that IT allowed firms to leverage other organizational resources to gain strategic advantages. Studies have identified various organizational factors that may interact with IT investment in enhancing organizational performance such as IT personnel and training (Sircar, Turnbow & Bordoloi, 2000), cross-functional integration and coordination (Palaniswamy & Frank, 2000), and business processes and work practices (Brynjolfsson & Hitt, 2000).

Impact of Internet on the Organizational Performance

Despite the wealth of studies concerning the impact of IT on organizational performance, few studies have empirically tested the hypothesis that the Internet has a positive impact on the organizational performance. Most studies report findings based on anecdotal evidence or unscientific estimates. One of such studies found that while expanding IT accounted for nearly two-thirds of the post-1995 productivity increase, the Internet did not appear to have contributed to the productivity rise (Oliner & Sichel, 2000). On the other hand, other studies estimated that the Internet generated cost savings of one to two percent per year and contributed from two-tenths to four-tenths of a percent to productivity growth (Litan & Rivlin, 2001). Other studies analyzed the role of the Internet more rigorously. Gross (2001) examined the Internet's contribution to U. S. productivity growth over a three-year period and suggested that Internet usage had a significant impact on productivity growth of roughly 0.25 percent per year. Furthermore, the

productivity enhancing power of the Internet was found to differ according to the extent to which IT was utilized by each industry. Interestingly the study found that the Internet had a greater impact on productivity gain in less IT-intensive industries than more IT-intensive industries.

Measuring IS Induced Organizational Performance Improvement

One of the reasons why researchers have derived at different and often conflicting conclusions about the impact of IT on business performance is that there is no standard way of defining and measuring what constitutes organizational performance (Rai, Patnayakuni, & Patnayakuni, 1997). Furthermore, relating the observed business improvement to IT investment poses another formidable challenge. Given the complexity of an organization, no single set of measures will be sufficient to capture all factors contributing to both IT investments and organizational performance. In the lack of established method to measure organizational performance as it is related to the use of the Internet, we selected profit, market share, and geographic expansion as the components to operationalize the organizational performance construct. Our selection of the variables reflects the existing literature as well as special characteristics of the Internet. Profit and market share are two of the most widely used measures of organizational performance (Cron & Sobol, 1983; Bender, 1986; Harris & Katz, 1989; Alpar & Kim, 1990; Mahmood & Mann, 1993).

While profit (and ultimately organization's market value) remains the ultimate measure for organizational success, firms often pursue other goals than profit. During the early days of the Internet dubbed as the "dot com" era many organizations, particularly Internet startups, set aside profit as the ultimate corporate mission and focused on increasing market share and expanding geographic reach. This behavior was justified as the Internet was perceived as a disruptive technology that would fundamentally alter the traditional market structure and dynamics. Companies believed that staking a claim in the cyber market place was too important to ignore even if it meant lower profit. Especially, the ubiquitous nature of the Internet allowed firms to compete beyond the traditional geographic boundaries. Taking these special characteristics of the Internet into consideration, we included market share and geographic expansion as part of organizational performance measure in addition to profit.

METHODOLOGY

We conducted a survey with the assistance of upper division MBA students enrolled in a course dealing with topics of electronic commerce and the Internet. The course required students to conduct firsthand research on business Internet practices. Each student selected two firms operating in the same industry and investigated the way they utilized the Internet and the issues and problems associated with the use of the Internet. To gather necessary data for the project, they used a standard survey questionnaire provided by the researchers and conducted personal interviews by phone or e-mail with the manager in order to follow up on the questionnaire and to uncover any issues and problems unique to the firm. The survey questionnaire adopted from Koh and Balthazard's earlier study (1998) was designed to address the following questions:

- How strategically important is the Internet for organizations and industries?
- How do organizations use the Internet?
- How effectively do they utilize the Internet?
- What issues and problems do they face in deploying the technology?
- How widely are intranets and extranets used and how are they used?

A total of 70 companies located in North America participated in the study. The sample -- although it was not randomly selected -- represented a broad spectrum of organizations in terms of industry and size. The industries represented in the study include: manufacturing and construction (35.7 percent), service (18.6 percent), finance/insurance/real estate (17.1 percent), sales (15.7 percent), healthcare (7.1 percent), and others (5.8 percent). The sample included firms of varying sizes as measured by the annual revenue: less than $1 million (15.6 percent), $1-10 million (21.9 percent), $10-100 million (25.0 percent), $100-500 million (21.9 percent), $500 million-1 billion (15.6 percent), $1-5 billion (28.1 percent), $5-10 billion (25.0 percent), and over $10 billion (9.4 percent).

Diffusion of Internet Technology

We presented a list of over 50 different categories of Internet applications generated from the aforementioned "Three-ring" framework and asked the respondents to check all categories for which their companies had implemented the Internet. We also permitted "write-in" categories. (See Appendix A for the list of the Internet applications included in the survey.)

For each Internet application presented in the survey, we assigned a score of 2 if the company had already implemented the application, 1 if it had not implemented but had an immediate plan to do so, and 0 if it had neither implemented or had an immediate plan. The average score for each application along with its standard deviation is presented in Appendix A. Some of the most widely implemented applications according to the survey include: providing product information to the public, providing company history and background to the public, advertising products and services, posting job openings and recruiting new employees, publishing company handbooks, policies, and newsletters for employees on intranets, and selling products and services to customers.

As anticipated, firms utilized the Internet more extensively for informational purposes than for transactional and operational purposes. The average score for all informational categories was 1.07, whereas the average for all transactional and the average for all operational categories were 0.51 and 0.49, respectively. The finding suggests that the diffusion of the Internet still remains in an early stage where informational use outspaces other uses of the Internet. We conjecture that the status of business Internet usage at the time of study can be best depicted by the second diagram (Figure 2a) of the Three-Ring framework.

Strategic Importance of the Internet

We asked the respondents their perceived strategic importance of the Internet for the organization as well as for the industry in which the organization operates. While the impact of the

Internet is apparent in businesses of all sizes and shapes, the level of urgency and the significance of the technology may vary from industry to industry and organization to organization. The nature of products and services that a company sells and the industry in which it operates may influence the level of strategic importance of the Internet to an organization. Thus, a simple comparison of companies without consideration of the industry type would not render an accurate picture. To remedy this inherent industry-to-industry bias, we devised a measure by which strategic importance of the Internet for an organization is assessed relative to the importance of the Internet for the industry in which it operates.

Each manager reported the level of importance of the Internet for his/her organization as well as the level for the industry using a scale from 0 (least important) to 10 (most important). To control for the variance among industries, we calculated the difference between the score for the organization and the score for the industry. This difference represents the company's relative position in its industry with regard to the level of strategic importance of the Internet perceived by the company. A positive value indicates that the company is ahead of its industry in conceiving or emphasizing the Internet as a strategic tool and a negative number implies that the company lags behind the industry. The greater the value, the more strategic gap exists between the company and its competitors.

Improvement of Business Performance

To assess the effectiveness of the Internet on improving business performance, we presented several business objectives -- increasing profit, increasing market share, expanding geographic reach, providing information, and providing better service -- and asked the respondents to what extent they were motivated to use the Internet for each objective. We also asked how successful they were with the Internet to accomplish the aforementioned objectives. We used a 5-point Likert scale to measure both questions, in which a higher score represents a higher level of importance or effectiveness. The prevailing objective of implementing the Internet was providing information with an average score of 4.10. The respondents also reported that they were more effective with the Internet in providing information (average score 3.84) than other objectives. On the other hand, they did not regard profit as a strong motivator for using the Internet (average score 2.87), nor did they believe that the Internet had been effective in generating profit (average score 2.85). These findings reaffirm that the Internet still remains in an early stage in which the Internet is predominantly used to disseminate information.

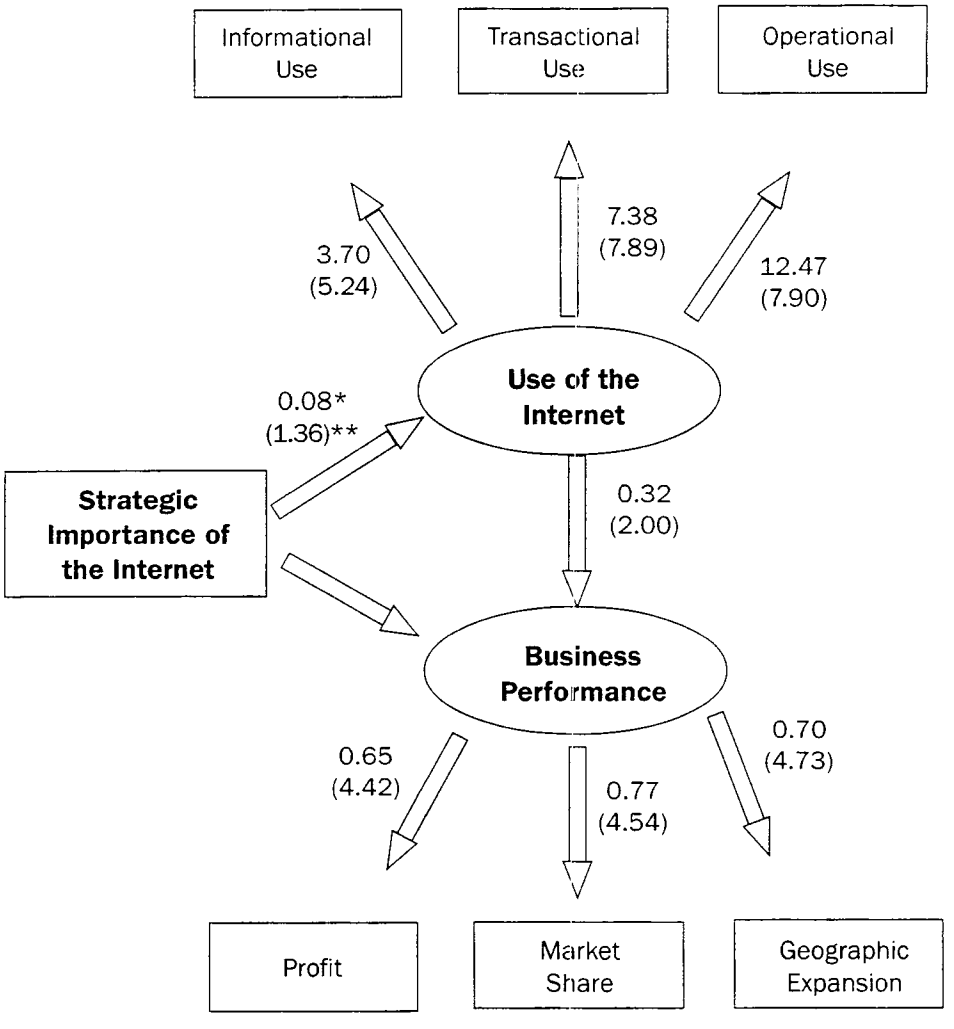
For analysis we chose three variables--profit, market share, and geographic expansion--as indicators to measure the latent variables of business performance improvement.

ANALYSIS

Using the data collected from the survey, we tested our research model linking three constructs-- (1) Strategic importance of the Internet, (2) Level of Internet use, and (3) Business Performance Improvements. Figure 3 shows an enhanced model with additional variables used to

operationalize the last two constructs. In the model, three variables -- representing three different uses of the Internet as suggested by the "Three-Ring" model -- were used to measure the extent to which an organization utilizes the Internet. To assess the level of business performance improvement resulting from the use of the Internet, we used three business performance indicators -- profit, market share, and geographic market.

Figure 3. Structural Equation Model



Chi-Square=12.52, df=12, p-value=0.41, RMSEA=0.026
(* coefficient ** t-value)

The model consists of three variables including two latent variables (Internet use and business improvement) with seven indicator variables. The covariance matrix for the seven input variables was calculated and used as input to perform a maximum likelihood linear structural relation analysis. The LISREL 8.12 (Jörekbod & Sörborm, 1993), a structural equation-modeling program, was used for this confirmatory factor analysis. A structural equation model (SEM) is a model of causal relationships among variables that encompasses and extends regression and factor analysis procedures (Hayduk, 1987; Bollen, 1989). Mertler and Vannatta (2001) define SEM as sophisticated version of path analysis incorporating unobservable, unmeasurable (latent) variables into the path model. The results of the analysis were examined to determine the degree of fit of the model and to evaluate significance of causal relationships in the model.

The assessment of model fit is not a straightforward task. SEM has no single statistical test that best describes the strength of the model's predictions. Instead, several goodness-of-fit measures are used to assess the results from three perspectives: (1) Absolute fit, (2) Incremental fit, and (3) Model parsimony. Commonly employed measures and criteria in evaluating SEM include: (1) Absolute fit indices, such as Non-significant χ^2 (at least P>0.05), Goodness-of-Fit Index (GFI, higher is better), Low Root Mean Square Residual (RMSR, lower than 0.08), Root Mean Square Error of Approximation (RMSEA, lower than 0.08); (2) Incremental fit indices, such as Normed Fit Index (NFI, greater than 0.90), Tucker-Lewis Index (TLI or NNFI, greater than 0.90), Adjusted GFI (AGFI, greater than 0.90); (3) Parsimonious fit indices, such as Parsimonious Goodness-of-Fit Index (PGFI, higher is better), Parsimonious Normed Fit Index (PNFI, higher is better).

Table 1 shows the result of goodness of fit measures. Analysis of the model resulted in an χ^2 (232, n=66) = 12.52 (p>.041) which indicates that data fit the model. Other indicators also confirmed good fit in general. Goodness-of-Fit index (GFI) of 0.95 indicates that the model fits very well because GFI of 1.0 indicates a perfect fit. The root mean square error of approximation (RMSEA) value of 0.026 is under acceptable limit of 0.08 and implies a good model fit. The adjusted goodness-of-fit index (AGFI) value of 0.89 is close to its recommended value of 0.9. Overall, the fit indices indicate that the model reproduces the covariance matrix well. Other indications that the model fits the data well are that all standardized residuals are greater than 2.0, except one (2.11). Also all the loadings between indicator and latent variables are either above or sufficiently close (0.38) to the cutoff value of 0.4. All of the criteria applied indicate the overall adequacy of factor solutions.

The path coefficients (Figure 3) were examined to determine whether or not they implied significant relationships between the corresponding variables. All the coefficients were positive and significant at either 10% or 5% level. Coefficient between 'Strategic Importance' and 'Performance' was significant at the 0.05 level. Also coefficient between 'Internet Use' and 'Performance' was significant at the 0.05 level. However, coefficient between 'Strategic Importance' and 'Internet Use' was statistically significant at the 0.10 level. All the other coefficients, between latent variables and observed variables (λ-X and λ-Y), were significant at the 0.05 level.

Table 1. Goodness-of-Fit Measures

Statistics	Criteria	Results
Degrees of Freedom		12
Absolute Fit		
Chi-Square (p-value)	Small	12.52 (0.41)
Normal Theory Weighted Least Squares Chi-Square (p-value)	Small	10.89 (0.54)
Root Mean Square Error of Approximation (RMSEA)	Below 0.1	0.026
Root Mean Square Residual (RMR)	Below 0.5	0.69
Goodness of Fit Index (GFI)	Above 0.9	0.95
Adjusted Goodness of Fit Index (AGFI)	Above 0.9	0.89
Comparative Fit		
Expected Cross-Validation Index (ECVI)	Small	0.68
Normed Fit Index (NFI)	Above 0.9	0.91
Non-Normed Fit Index (NNFI)	Above 0.9	0.99
Comparative Fit Index (CFI)	Above 0.9	1.00
Incremental Fit Index (IFI)	Above 0.9	1.00
Relative Fit Index (RFI)	Above 0.9	0.85
Parsimonious Fit		
Parsimony Normed Fit Index (PNFI)	Above 0.9	0.52
Parsimony Goodness of Fit Index (PGFI)	Large	0.41
Independence AIC	Small	156.74
Model AIC	Small	42.89
Saturated AIC	Small	56.00
Independence CAIC	Small	179.06
Model CAIC	Small	93.93

Next, total effects of latent variables on each indicator were examined (Table 2). The total effect of either 'Strategic Importance' or 'Internet Use' on 'Business Performance' was significant at the 0.05 level, but the total effect of 'Strategic Importance' on 'Internet Use' was significant at the 0.10 level. The total effect of 'Strategic Importance' among three performance indicators was the most significant on 'Geographic Expansion' and the least significant on 'Profit.' The total effect of 'Use of Internet' had the same result, the most significant on 'geographic market expansion' and the least significant on 'Profit."

Conclusively, the results show that level of strategic importance perceived by management is a good predictor of diffusion of Internet technology and that these two factors collectively improve business performance.

Table 2. Total Effects on Indicators

		On					
		Internet Use			Performance		
		Information	Transaction	Operation	Profit	Market Share	Geo. Expansion
Total Effects of	Strategic Importance	0.30* (1.34)**	0.61 (1.36)	1.03 (0.36)	0.12 (2.57)	0.14 (2.60)	0.13 (2.66)
	Use of Internet	3.70 (5.24)	7.38 (7.89)	12.47 (7.90)	0.21 (1.99)	0.24 (2.00)	0.77 (6.34)
	Performance Improvement				0.65 (4.42)	0.77 (4.54)	0.70 (4.73)

* coefficient
** number in parenthesis represents t-value

DISCUSSION AND CONCLUSIONS

This work empirically tested the relationship among three variables with initial industry difference removed. The significance of this relationship has several implications for both researchers and practitioners. First, the significance of the model suggests that the constructs used are reasonable measures for the study. Second, though widely accepted in theory the confirmation of the relationship allows researchers to pursue more reliable models either by replication of this research or by establishing a new theoretical model. Future models for testing should elaborate on the operational definition of 'business performance improvement.' Third, particularly important to practitioners, this work provides evidence to underscore the importance of organizational support and successful implementation for business performance improvement.

Our study attempted to take a snapshot of the fast-evolving technology with an enormous impact on all facets of business. As such the study had several limitations. First of all, our research model includes three major constructs, each of which in turn consists of numerous sub-constructs each of which needs to be carefully analyzed. It was impractical, if not impossible, for this exploratory study to account all of these constructs and sub-constructs. The research model was operationalized to the best of the researchers' ability but it was neither complete nor permanent. For example, we selected three variables -- profit, market share, and geographic expansion -- to measure organizational performance. Our decision to include these three items was influenced by some of the prevailing characteristics of the Internet at the time. Although we deliberately and carefully selected these measures, it is possible that other performance criteria (e.g., employee morale, customer satisfaction, public relations, etc.) that were not included in the study could have influenced the outcome of the study. Another limitation of the study was with the

approach to collecting data for the study. The data was collected by a somewhat unorthodox method as part of a research project for an MBA course. We had to make a compromise in the way the research was designed and administered because of potentially conflicting interest between the researchers and the students. Consequently our sample was not random; rather it was created largely based on the interest and convenience of individual students who participated in the project. Nevertheless, we do not believe that the absence of randomness in the sampling process had much significant adverse impact on the outcome of the study. The sample represented a broad spectrum of organizations in terms of industry, size, and other demographic criteria.

REFERENCES

Alpar, P. & Kim, M. (1990). A microeconomic approach to the measurement of information technology value. *Journal of Management Information Systems, 7*(3), 55-69.

Bakos, J. Y. (1991). A strategic analysis of electronic marketplaces. *MIS Quarterly, 15*(3), 295-310.

Bender, D. H. (1986). Financial impact of information processing. *Journal of Management Information Systems, 3*(2), 22-32.

Berthon, P., Pitt, L., & Watson, R. T. (1996). Marketing communication and the world wide web. *Business Horizons, 39*(5), 24-32.

Bharadwaj, A. S. (2000). A resource-based perspective on information technology capability and firm performance: An empirical investigation. *MIS Quarterly, 24*(1), 169-196.

Bollen, K. A. (1989). *Structural equations with latent variables.* New York: John Wiley & Sons.

Brynjolfsson, E. & Hitt, L. M. (2000). Beyond computation: Information technology, organizational transformation and business performance. *Journal of Economic Perspectives, 14*(4), 23-48.

Clark, B. (1997). Welcome to my parlor. *Marketing Management, 5*(4), 10-25.

Clarke, A. (1999). Playing catch-up. *Asian Business, 35*(8), 61-63.

Cron, W. & Sobol, M. (1983). The relationship between computerization and performance: A strategy for maximizing economic benefits of computerization. *Information and Management, 6*, 171-181.

Gibson, C. F. & Nolan, R. L. (1974). Managing the four stages of EDP growth. *Harvard Business Review, 52*(1), 76-87.

Goss, E. (2001). The Internet's contribution to U. S. productivity growth. *Business Economics, 36*(4), 32-42.

Harris, S. E. & Katz, J. L. (1989) Predicting organizational performance using information technology managerial control ratios. *Proceedings of the Twenty-Second Annual Hawaii International Conference on Systems Sciences,* 197-204.

Hayduk, L. A. (1987). *Structural equation modeling with LISREL: Essentials and advances.* Baltimore, MD: John Hopkins University Press.

Hoffman, D. L. & Novak, T. P. (1996). Marketing in hypermedia computer mediated environments: Conceptual foundations. *Journal of Marketing, 60*(3), 50-68.

Jörekbod & Sörborm. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language.* Chicago, IL: Scientific Software International, Inc.

Katz, A. I. (1993). Measuring technology's business value. *Information Systems Management, 10,* 33-39.

Koh, C. E. & Balthazard, P. (1998, November). The action-audience model: A framework for internet-based electronic commerce and a survey of business internet use. *Proceedings of the 29th Annual Meeting of the Decision Sciences Institute,* Las Vegas, Nevada.

Litan, R. E. & Alice, M. R. (2001). Projecting the economic impact of the internet. *American Economic Review, 91*(2), 313-317.

Mahmood, A. & Mann, G. (1993). Measuring the organizational impact of information technology investment: An exploratory study. *Journal of Management Information Systems, 10*(1), 97-122.

McFarlan, F. W. & McKenney, J. L. (1982). The information archipelago - Gaps and bridges. *Harvard Business Review, 60*(5), 109-119.

McFarlan, F. W. (1984). Information technology changes the way you compete. *Harvard Business Review, 62*(3), 98-103.

Mertler, C. A. & Vannata, R. A. (2001) *Advanced and multivariate statistics: Practical application and interpretation.* Los Angeles, CA: Pyrczak Publishing.

Mishina, M. (1998). Internet pushes business frontiers. *As/400 systems Management, 26*(6), 8-9.

Nolan, R. L. (1979). Managing the crises in data processing. *Harvard Business Review, 57*(2), 115-126.

Oliner, S. D. & Sichel, D. E. (2000). The resurgence of growth in the late 1990s: Is information technology the story? *Journal of Economic Perspectives, 14*(4), 3-22.

Palaniswamy, R. & Frank, T. (2000). Enhancing manufacturing performance with ERP systems. *Information Systems Management, 17*(3) 43-55.

Palmer, J.W. & Griffith, D. A. (1998). An emerging model of web site design for marketing. *Communications of the ACM, 41*(3), 44-51.

Powell, T. C. & Dent-Micallef, A. (1997). Information technology as competitive advantage: The role of human, business, and technology resources. *Strategic management Journal, 18*(5), 375-405.

Raho, L. E., Belohlav, J. A. & Fiedler, K. D. (1987). Assimilating new technology into the organization: An assessment of McFarlan and McKenney's model. *MIS Quarterly, 11*(1), 47-57.

Rai, A., Patnayakuni, R., & Patnayakuni, N. (1997). Technology investment and business performance. *Communications of the ACM, 40*(7), 89-97.

Roach, S. S. (1991). Services under siege--the restructuring imperative. *Harvard Business Review, 69*(5), 82-91.

Sircar, S., Turnbow, J. L., & Bordoloi, B. (2000). A framework for assessing the relationship between information technology investments and firm performance. *Journal of Management Information Systems, 16*(4), 69-97.

Strassman, P.A. (1990). *The business value of computers: An executive's guide.* New Canaan, Connecticut: The Information Economics Press.

Zmud, R. A. (1982). Diffusion of modern software practices: Influence of centralization and formalization. *Management Science, 28*(12), 1421-1431.

Zmud, R. A. (1984). An examination of push-pull theory applied to process innovation in knowledge work. *Management Science, 30*(6), 727-738.

APPENDIX A
List of Internet Uses Surveyed by the Study

For each item, the respondent was asked if his/her company had already implemented (Score = 2), had an immediate plan to implement (Score = 1) if it had not already implemented, or neither had implemented nor had a plan (Score = 0). The average score of all responses is shown with the standard deviation for each item in the following table.

Informational Uses	Average	Std Dev
Providing product information to people on the Web	1.91	0.41
Providing company history and background information about your firm on the Web	1.80	0.61
Advertising products and services on your page	1.78	0.62
Posting job openings	1.22	0.91
Publishing company handbook or policies for employees on an intranet	1.00	0.88
Publishing company newsletters for employees on an intranet	0.93	0.89
Internal posting of employment opportunities on an intranet	0.87	0.88
Providing information to business partners	0.78	0.84
Advertising products and services on others' home pages (e.g., banners, etc.)	0.75	0.90
Posting information for stockholders	0.63	0.91
Sharing internal reports with another firm (for example, sharing quality control information with your supplier)	0.60	0.80
Posting company policies	0.59	0.85
Informational Use Average	**1.07**	

Transactional Uses	Average	Std Dev
Selling products to customers	0.97	0.96
Electronic data interchange (EDI) with a supplier	0.94	0.91
Electronic purchasing from a supplier	0.72	0.88
Allowing end-customers to place orders with you	0.69	0.89
Selling on-line services to customers (e.g., selling access to a ticker tape of stock prices)	0.61	2.50
Giving access to inventory information to a customer	0.59	0.83
Electronic fund transfer (EFT)	0.56	0.84
Billing business customers through the Internet	0.54	0.80
Sending electronic payments to a supplier	0.53	0.79
Electronic selling to other businesses)	0.51	0.79
Billing through the Internet	0.47	0.78
Allowing employees to choose and change retirement plans on-line	0.42	0.74
Allowing employees to choose and change health insurance plans on-line	0.31	0.61
Providing virtual coupons to customers	0.28	0.62
Allowing employees to choose and change payroll options on-line	0.28	0.62
Conducting public auctions on the Internet	0.12	0.41
Allowing employees to trade company stocks on-line	0.11	0.40
Transactional Use Average	**0.51**	

Operational Uses	Average	Std Dev
Registering your firm on widely-used search engines (e.g., Yahoo! and the like)	1.12	0.95
Registering your firm on industry specific Web sites (e.g., for sourcing purposes)	1.02	0.94
Recruiting new employees by using the Internet (collecting resumes and applications	0.96	0.94
Providing operational information (e.g., on-line procedural manuals for employees	0.96	0.90
Coordinating communication about projects	0.91	0.95
Discussing strategies concerning current products/services with others in your firm	0.82	0.96
Providing services for a product sold (e.g., on-line help line)	0.78	0.95
Developing a new product in cooperation with people in other departments	0.75	0.92
Conducting consumer surveys	0.74	0.86
Scheduling business meetings between employees of your organization	0.72	0.92
Allowing sales staff to access inventory or sales databases	0.63	0.88
Managing workflow	0.58	0.86
On-line Web tracking of product or service	0.54	0.84
Posting requests for proposals (RFP)	0.48	0.79
Web based "sourcing" of information about potential business partners	0.48	0.82
Supporting a bulletin board system (BBS)	0.45	0.76
Checking inventory of a supplier	0.45	0.76
Teleconferencing over the Intranet with employees of your firm	0.41	0.70
Coordinating a manufacturing schedule with business partners	0.38	0.76
Giving access to your inventory to a supplier	0.36	0.69
Broadcasting (e.g., Bit streaming audio and/or video)	0.33	0.69
Virtual publishing (e.g., 'zines, on-line trade journals)	0.32	0.68
Supporting an Internet news group (Usenet)	0.30	0.65
Conducting on-line focus groups	0.29	0.63
Voice conversations over the Internet but between entities within the organization	0.29	0.57
Teleconferencing with people from other firms	0.29	0.58
Developing a new product in cooperation with a business partner	0.29	0.63
Sponsoring and/or operating chat rooms	0.28	0.63
Supporting an Internet Listserv	0.28	0.63
Carrying out bidding processes with suppliers	0.28	0.60
On-line scheduling system for meetings with customers (not using electronic mail)	0.27	0.62
Discussing strategies concerning current products/services with a strategic ally	0.27	0.62
On-line scheduling for meetings with business partners (not e-mail)	0.25	0.59
Providing a mechanism for a supplier to conduct business with a client	0.24	0.56
International voice conversations over the Internet	0.24	0.52
Voice conversations over the Internet with entities outside the organization	0.23	0.49
On-line web-based proxy voting	0.17	0.51
Operational Use Average	**0.49**	